INSTRUCTIONS GEI-10590B

GENERAL ELECTRIC

ELECTROSTATIC VOLTMETER

Cat. 32C300

Supercedes GEI-10590A

INSTRUCTIONS GEI-10590B

ELECTROSTATIC VOLTMETER

CAT. NO. 32C300

These instructions do not purport to cover all details or variations in equipment nor to provide for every possible contingency to be met in connection with installation, operation or maintenance. Should further information be desired or should particular problems arise which are not covered sufficiently for the purchaser's purposes, the matter should be referred to the General Electric Company.

APPARATUS DEPARTMENT

GENERAL ELECTRIC

SCHENECTADY, N. Y.

9-45 (50)

Supersedes GEI-10590A

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ELECTROSTATIC VOLTMETER

CAT. 32C300

GENERAL:

These instruments are intended for the measurement of voltage in circuits where one line is grounded, and are available in full scale ranges from 3 to 35 kv, inclusive. Two views of an electrostatic voltmeter rated 20 kv are shown on photograph 1008298.

Standard Full Scale Ranges:

Rating	Cat. No.	Type of Voltage	Approx. Mean Capacitance Micromicrofarads	Microamperes-Full Scale Charging Current At 60 Cycles
3 kv	32C300G10	DC & AC	40 to 80	35
5 kv	" G11	" "	25.0	50
10 kv	" G12	" "	18.0	80
15 kv	" G13	" "	17.0	120
20 kv	" G14	" "	16.0	155
25 kv	" G15	Peak Reading or D.C.	15.5	
30 kv	" G16	" " " "	15.0	
35 kv	" G17	" " " "	13.5	
3 kv	" G18	AC over 700 cycles	40 to 80	
5 kv	" G19	" " " "	25.0	
10 kv	" G20	" " " "	18.0	
15 kv	" G21	" " " "	17.0	
20 kv	" G22	" " " "	16.0	

Case

The case is of 1/8 inch aluminum having a dull black finish on the interior and a grey crackle finish on the exterior. The instrument is 12 3/4 inches wide, 11 7/8 inches high, 20 7/8 inches long and weighs 29 pounds. The high voltage terminal projects 4½ inches above the top of the case.

Element

The moving system is the inner of two concentric cylindrical sections and is free to move on its pivots when there is a

potential difference between it and the outer cylindrical sections which are stationary and are electrically connected to the case. The free undamped period of the system is approximately 1.4 seconds while the responsiveness is about 4 seconds. Aluminum damping vanes are mounted on the moving system shaft to provide magnetic damping. A mirror also mounted on this shaft, reflects a beam of light to the scale, which provides a means of indicating the position of the moving system. The optical system shown on photograph 1008297, furnishes this beam of light. The switch, shown on photograph 1008298 just below the scale, controls the lamp voltage supply furnished by dry cells located within the case. The moving system is insulated from the case and is connected to the high terminal, "H" on photograph 1008298, through a current limiting resistor or a metal cartridge, "L" on the same photograph. Zero adjustment of the moving system is provided by a slotted and recessed shaft immediately in front of the high voltage terminal ("M" on photograph 1008298). The "ground" binding post, "K" on photograph 1008298, is connected to the stationary plates and also to the case which serves as an electrostatic shield. The instrument scale is 7½ inches long and marked in kilovolts (rms) unless otherwise stated.

Protective Resistor or Metal Cartridge

A protective resistor of ceramic material (groups 10 to 17 only) is enclosed in textolite tubing. It has a value of 2 megohms and is in series with the high voltage side at all times. This serves as a current-limiting resistor if voltage in excess of the

flashover value is accidentally applied.

In groups 18 to 22, this protective resistor has been replaced with a tubular metal cartridge for use on frequencies from 700 to 1,000,000 cycles. Care should be taken that the rated voltage is not exceeded on these instruments as there is no protection if a flashover occurs.

The flashover value of the instrument will depend upon the rating, and will be about twice the rated R.M.S. kilovolts when used on a good sine wave voltage at sea level for instruments rated 3 to 20 kilovolts and not less than 50 kilovolts peak or D. C. for instruments rated more than 20 kilovolts. A minimum number of insulating supports are used between the moving system and the case to permit the insulation resistance to be as high a value as possible. The top insulating plate, upon which the resistor housing is mounted, is a transparent plastic resin and permits ready inspection of the moving system without disassembling the instrument.

Instrument Capacitance

The capacitance of these instruments with full scale ranges from 5 to 35 kv varies from 13 to 25 mmf (see page 1) and changes not more than 1/2 of 1% from zero to full scale position. For instruments of lower than 5 kv full scale rating the capacitance, as well as the change of capacitance from zero to full scale position, is somewhat greater. Both changes become progressively greater as the voltage rating of the instrument decreases.

Accuracy of Indication

Readings correct within 2% of full scale can be obtained on d-c and up to 700 cycles on a-c. If groups 10 to 17 are used above 700 cycles, the indication for a given voltage will decrease due to the voltage drop across the protective resistor. In groups 18 to 22, this resistor has been replaced with a metal cartridge so that readings can be obtained on frequencies up to 1,000,000 cycles per second. When these instruments are used on D.C. or frequencies less than 700 cycles, readings correct within 2% of the full scale value can be obtained and on frequencies from 700 to 1,000,000 cycles, readings correct within 5% of full scale can be obtained.

OPERATION:

To maintain the specified accuracy, the instrument must be mounted on a reasonably level horizontal plane. Snapping the toggle switch, mounted under the scale, to the "On" position will energize the light system and cause a beam to appear on the scale. Since this instrument is used to measure voltages which are hazardous to life, never touch the switch or any part of the instrument when voltage is applied. A zero adjuster is provided to set the light-beam on zero. It is recessed in the top insulating plate, beside the high bushing "M" on photograph 1008298. Adjustment is obtained by inserting a screw driver in the hole, and turning it until the beam is in the proper position. Should the light-beam come out of focus, the lens system should be readjusted. Removing plate "J" shown on photograph 1008298 will

permit access to the optical system shown on photograph 1008297. Lamp "A" may be moved up and down by loosening nut "D", and back and forth by loosening screw "C". Collecting lens "B" must be kept a 1-inch distance from the lamp. The beam image can be changed in sharpness by loosening screw "F" and sliding post "R" back or forth. Loosening screw "G" will permit rotating post "R" which will adjust the width of the beam.

This instrument is designed for use on circuits with one side grounded. In making connections, attach the high side of the line to binding post "H", shown on photograph 1008298, and connect the case binding post, "K" on the same photograph, to ground. Any other method of connection will cause the case to become useless as a shield as well as hazardous to the operator.

Maintenance

To replace the lamp, remove side plate "J", then slide lamp cap upward and the lamp will be accessible. The bayonet type of lamp is used to prevent the possibility of loosening.

To replace the two #6 dry cells, remove the front panel, unfasten one end of strap "S" and disconnect the wires at the cells. When installing fresh batteries, connect them in series so that the total available voltage for the lamp is 3 volts.

Replacements

To secure a new lamp, order Mazda lamp No. 43.

The batteries used are #6 (1.5 volt) dry cells.

These instruments can be converted to full scale ratings from 3 to 35 kv (see table on page 1) by making minor adjustments to the system and marking a new scale. Instruments with a maximum rating

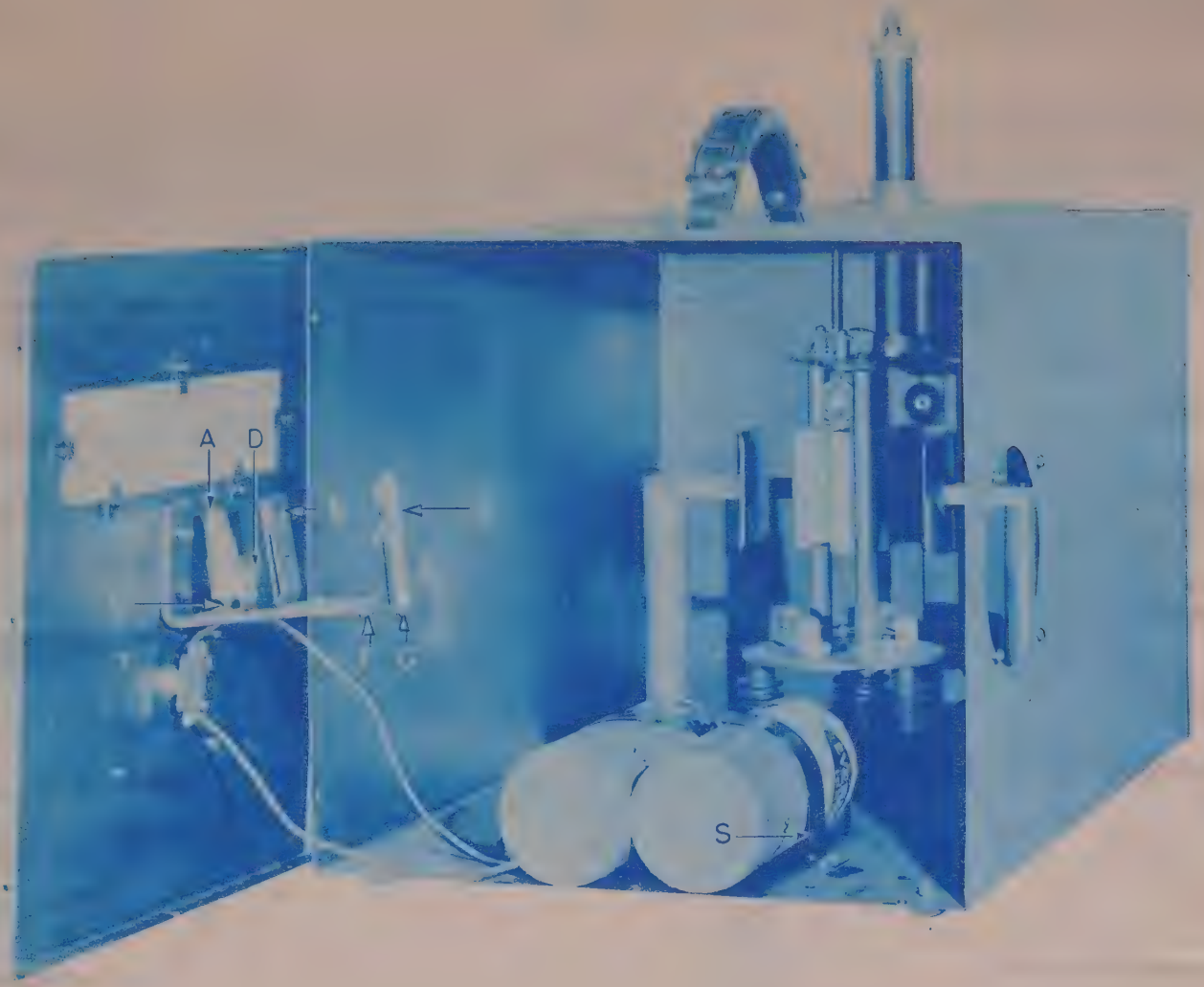
of 700 cycles can be converted for use up to 1,000,000 cycles by replacing the current-limiting resistor with a tubular metal cartridge. This service is rendered by the General Engineering and Consulting Laboratory at Schenectady, New York.

When ordering renewal or spare parts, give catalog and serial number of the instrument.

June 19, 1945

1008 298 2 G-E ELECTROSTATIC VOLTMETERS, CAT.32C300. BOTH OBLIQUE FRONT VIEW: (FROM LEFT) AT LEFT, AND (FROM RIGHT) AT RIGHT.

FILING NO.8851 E361.1 5-8-45



1008 297 G-E ELECTROSTATIC VOLTMETER. PANEL REMOVED. OBLIQUE FRONT VIEW FROM RIGHT.

FILING NO.8851, 6200 E361.1 5-8-45

Sams Tech 10- -67

GEI-10590C

INSTRUCTIONS

ELECTROSTATIC VOLTMETER

CAT. NO. 32C300

GENERAL ELECTRIC

Fig. 1

Fig. 2

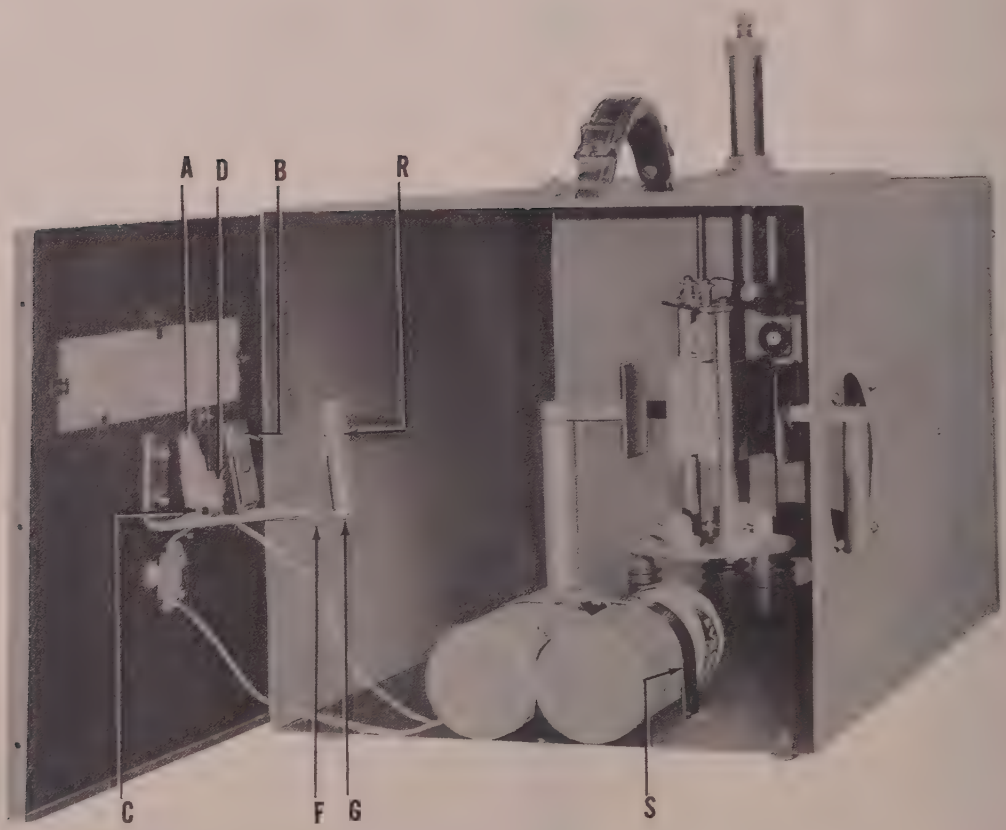


Fig. 3

Three Views of an Electrostatic Voltmeter, Cat. No. 32C300

ELECTROSTATIC VOLTMETER

CAT. NO. 32C300

General

These instruments are intended for the measurement of voltage in circuits where one line is grounded, and are available in full-scale ranges from 3 to 35 kv, inclusive. An electrostatic voltmeter rated 20 kv is shown in Fig. 1.

about four seconds. Aluminum damping vanes are mounted on the moving system shaft to provide magnetic damping. A mirror also mounted on this shaft, reflects a beam of light to the scale, which provides a means of indicating the position of the moving system. The optical system, shown in Fig. 3, furnishes this beam of light. The switch,

Standard Full-scale Ranges

Scale Marking KV (RMS AC, or DC)& Recommended DC Voltage	Maximum Recommended AC Voltage		Cat. No.	Type of Voltage	Approx Mean Capacitance (uuf)	Full-scale Charging Current at 60 cps (ma)
	Peak	RMS				
3	5	3	32C300G10	AC or DC	40-80	35
5	8	5	32C300G11	AC or DC	25.0	50
10	15	10	32C300G12	AC or DC	18.0	80
15	24	15	32C300G13	AC or DC	17.0	120
20	30	20	32C300G14	AC or DC	16.0	155
25	25	17.5	32C300G15	AC or DC	15.5	
30	30	21	32C300G16	AC or DC	15.0	
35	35	25	32C300G17	AC or DC	13.5	
3	5	3	32C300G18	AC over 700 cps or DC	40-80	
5	8	5	32C300G19	AC over 700 cps or DC	25.0	
10	15	10	32C300G20	AC over 700 cps or DC	18.0	
15	24	15	32C300G21	AC over 700 cps or DC	17.0	
20	30	20	32C300G22	AC over 700 cps or DC	16.0	

Description

Case

The case is of 1/8-inch aluminum having a dull black finish on the interior and a gray crackle finish on the exterior. The instrument is 12 3/4 inches wide, 11 7/8 inches high, 20 7/8 inches long, and weighs 29 pounds. The high-voltage terminal projects 4 1/2 inches above the top of the case.

Element

The moving system is the inner of two concentric cylindrical sections and is free to move on its pivots when there is a potential difference between it and the outer cylindrical sections which are stationary and are electrically connected to the case. The free undamped period of the system is approximately 1.4 seconds while the responsiveness is shown in Fig. 1 and 2, just below the scale, controls the lamp-voltage supply furnished by dry cells located within the case. The moving system is insulated from the case and is connected to the high-voltage terminal, "H" in Fig. 1, through a current limiting resistor or a metal cartridge, "L" in the same figure. Zero adjustment of the moving system is provided by a slotted and recessed shaft immediately in front of the high-voltage terminal, "M" in Fig. 1. The "ground" binding post, "K" in Fig. 2, is connected to the stationary plates and also to the case which serves as an electrostatic shield. The instrument scale is 7 1/2 inches long and marked in kilovolts (rms) unless otherwise stated.

Protective Resistor or Metal Cartridge

A protective resistor of ceramic material (groups 10 to 17 only) is enclosed in Textolite tubing. It has a value of two megohms and is in series with the high-voltage side at all times. This serves as a current-limiting resistor if voltage in excess of the flashover value is accidentally applied.

In groups 18 to 22, this protective resistor has been replaced with a tubular metal cartridge for

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use on frequencies from 700 to 1,000,000 cycles. Care should be taken that the rated voltage is not exceeded on these instruments as there is no protection if a flashover occurs.

The flashover value of the instrument will depend upon the rating, and will be about twice the rated rms kilovolts when used on a good sine-wave voltage at sea level for instruments rated 3 to 20 kilovolts and not less than 50 kilovolts peak or direct current for instruments rated more than 20 kilovolts. A minimum number of insulating supports are used between the moving system and the case to permit the insulation resistance to be as high a value as possible. The top insulating plate, upon which the resistor housing is mounted, is a transparent plastic resin and permits ready inspection of the moving system without disassembling the instrument.

Instrument Capacitance

The capacitance of these instruments with full-scale ranges from 5 to 35 kv varies from 13 to 25 mmf (see the table of Standard Full-scale Ranges) and changes not more than 1/2 of 1 per cent from zero to full-scale position. For instruments of lower than 5-kv full-scale rating, the capacitance, as well as the change of capacitance from zero to full-scale position, is somewhat greater. Both changes become progressively greater as the voltage rating of the instrument decreases.

Accuracy of Indication

Readings correct within 2 per cent of full scale can be obtained on direct current and up to 700 cycles on alternating current. If groups 10 to 17 are used above 700 cycles, the indication for a given voltage will decrease due to the voltage drop across the protective resistor. In groups 18 to 22, this resistor has been replaced with a metal cartridge so that readings can be obtained on frequencies up to 1,000,000 cycles per second. When these instruments are used on direct current or frequencies less than 700 cycles, readings correct within 2 per cent of the full-scale value can be obtained and on frequencies from 700 to 1,000,000 cycles, readings correct within 5 per cent of full scale can be obtained.

Operation

To maintain the specified accuracy, the instrument must be mounted on a reasonably level horizontal plane. Snapping the toggle switch, mounted under the scale, to the ON position will energize the light system and cause a beam to appear on the scale. Since this instrument is used to measure voltages which are hazardous to life, never touch the switch or any part of the instrument when voltage is applied. A zero adjuster is provided to set the light beam on zero. It is recessed in the top insulating plate, beside the high bushing "M" in Fig. 1. Adjustment is obtained by inserting a screw driver in the hole, and turning it until the beam is in the proper position. Should the light beam come out of focus, the lens system should be readjusted. Removing plate "J," shown in Fig. 1, will permit access to the optical system shown in Fig. 3. Lamp "A" may be moved up and down by loosening nut "D," and back and forth by loosening screw "C." Collecting lens "B" must be kept a 1-inch distance from the lamp. The beam image can be changed in sharpness by loosening screw "F" and sliding post "R" back and forth. Loosening screw "G" will permit rotating post "R" which will adjust the width of the beam.

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To replace the lamp, remove the side plate "J," then slide the lamp cap upward and the lamp will be accessible. The bayonet type of lamp is used to prevent the possibility of loosening.

To replace the two No. 6 dry cells, remove the front panel, unfasten one end of strap "S" and disconnect the wires at the cells. When installing fresh batteries, connect them in series so that the total available voltage for the lamp is three volts.

Replacements

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The batteries used are No. 6 (1.5-volt) dry cells.

These instruments can be converted to full-scale ratings from 3 to 35 kv by making minor adjustments to the system and marking a new scale. Instruments with a maximum rating of 700 cycles can be converted for use up to 1,000,000 cycles by replacing the current-limiting resistor with a tubular metal cartridge. This service is rendered by the Meter and Instrument Division at West Lynn, Mass.

When ordering renewal or spare parts, give catalog and serial number of the instrument.

APPARATUS DEPARTMENT

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GENERAL ELECTRIC

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